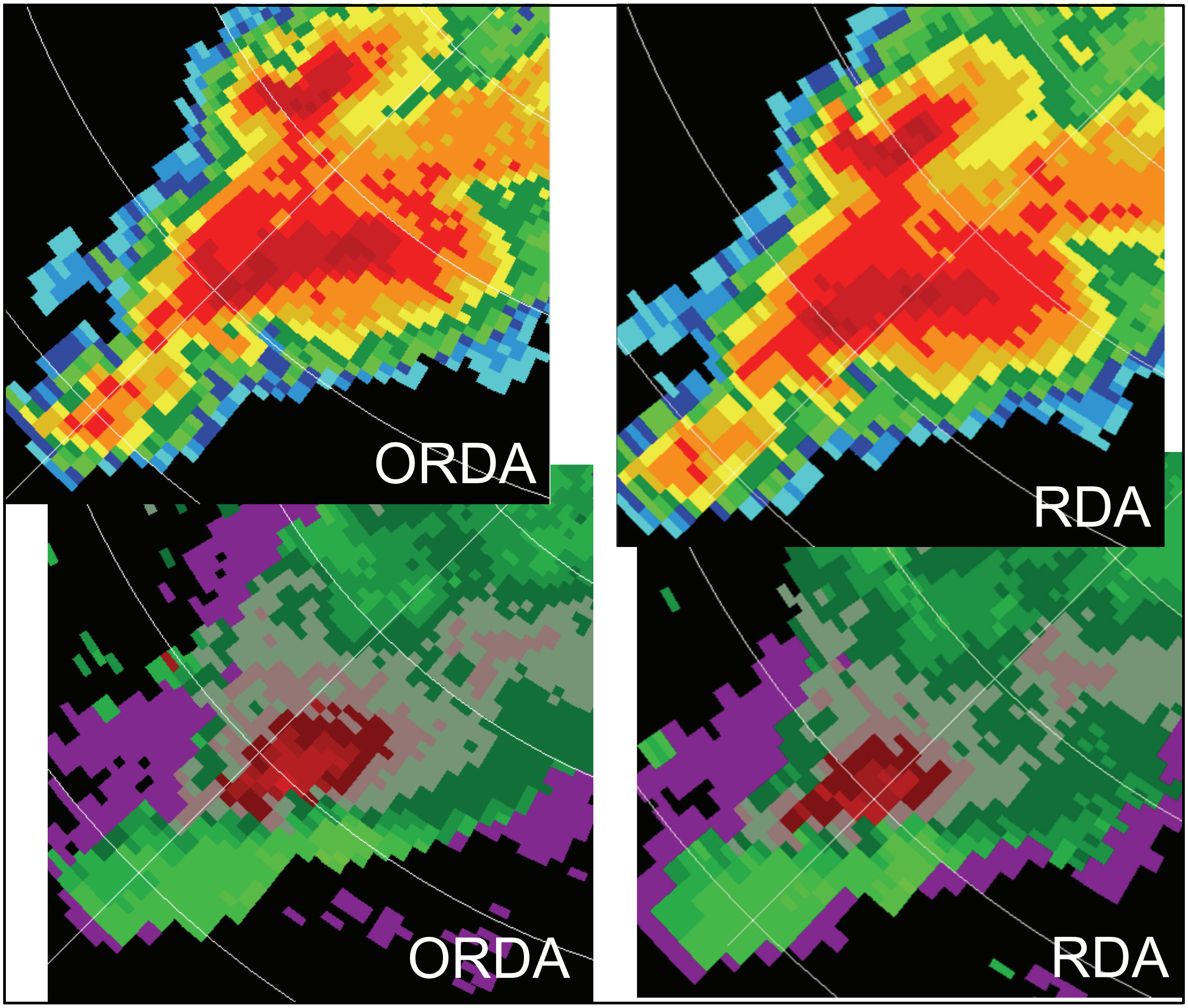
# Open RDA Build 7.0 Preview




**Presented by the**

**Warning Decision Training Branch**

***Beta Test Version***

Version: 0508

# Overview

The Open RDA (ORDA) is a significant upgrade to the Radar Data Acquisition (RDA) functional area of the WSR-88D. Many of the legacy RDA components, such as the signal processor, will be replaced. This training will present the purpose of the ORDA upgrade, an overview of the hardware and software, the ORDA related windows at the Master System Control Function (MSCF), and the operational impacts.

### Differences

The Base Data generated by the ORDA will have some differences in appearance as compared to the legacy RDA. In some cases these differences have little operational impact. In other cases the operational impact is a significant improvement in the quality of the Base Data. The information in this document reflects the pre-beta test state of knowledge of the operational impacts of the ORDA.

### Deployment

The ORDA Deployment is scheduled for November 2005 through September 2006. The date for any particular office is available from the ORDA Web Site:

http://www.orda.roc.noaa.gov/deployment/schedule/schedule.asp

The RPG Build version that will be in place for the initial part of the ORDA deployment will be RPG Build 7.0. ORDA/RPG Build 8.0 is scheduled to be deployed in the Spring of 2006. At the time when ORDA/RPG Build 8.0 is released, those sites that already have ORDA installed will be upgraded to Build 8.0 on both the RPG and ORDA. For all remaining Single channel systems, the initial ORDA installation will be ORDA Build 7.0. The site then later upgrades to Build 8.0 for the RPG and ORDA. Only NWS Redundant and FAA sites will have an initial ORDA installation with Build 8.0. ***The material in this document is based on ORDA and RPG Build 7.0.***

## Purpose

The requirements for converting the legacy RDA to an open systems design (ORDA) are the same requirements that led to the conversion of the legacy RPG to the ORPG. An Open System design is flexible with respect to hardware, software and communications. The initial deployment of the ORDA will significantly improve processing speeds in components such as the signal processor. It will offer improvements that benefit ***both*** weather decision makers and system maintainers such as a better calibrated radar with simpler calibration procedures.

### New Science and Applications

The flexible design will allow for planned upgrades and provide the necessary foundation for future enhancements. These include advanced techniques for mitigating velocity and range ambiguities and Dual Polarization.

## Hardware Overview

The ORDA system is essentially a new set of hardware components, along with the necessary software and communications equipment. The components that are of operational interest are presented here.

### RVP8 - Radar Video Processor

The Radar Video Processor (RVP8) is the digital receiver/signal processor of the ORDA system. The RVP8 is a SIGMET Corporation, industrial grade PC with LINUX as the operating system. The processing speed and memory of the RVP8 is sufficient for complex algorithms such as Dual Polarization.

The RVP8 replaces the legacy Hardwired Signal Processor (HSP) and the Programmable Signal Processor (PSP). Though it is a commercial product, it does contain some features that were customized by SIGMET for the WSR-88D. For example, the use of Batch mode is unique to the WSR-88D, and SIGMET modified the code in the RVP8 to accommodate Batch mode. SIGMET also implemented the legacy Point Clutter Suppression algorithm in the RVP8 (Figure 1).

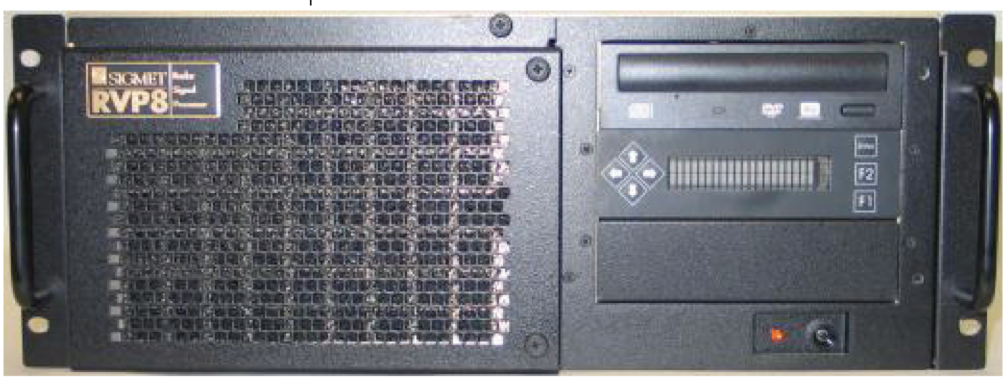



**Figure 1.** The RVP8, ORDA's digital receiver and signal processor.

## RCP8 - Radar Control Processor

The Radar Control Processor (RCP8) is a replacement for the Concurrent Micro 5 computer. As with the RVP8, the RCP8 is also a commercial product from the SIGMET Corporation, running with LINUX as the operating system (Figure 2).

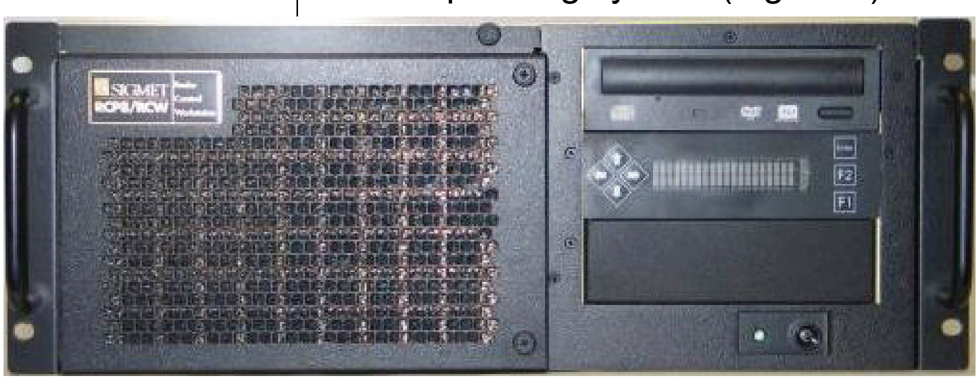



**Figure 2.** The RCP8, ORDA's radar control processor.

With the legacy system, when the RDA was controlled locally at the RDA shelter, the commands were going to the Micro 5. Similarly with the ORDA system, when the RDA is controlled locally at the RDA shelter, the commands are going to the RCP8. When the RDA is controlled remotely from the MSCF, the commands are also going to the RCP8.

The RCP8 is connected to the Digital Control Unit (DCU), which drives the pedestal and implements the current VCP. When a VCP has been changed or downloaded, the RCP8 sends the VCP information to the DCU. The DCU is essentially telling the pedestal and antenna “what to do” in order to execute that particular VCP.

RCP8 and VCP Usage

The local versions of the VCPs are stored at the RCP8. Just as with the legacy RDA, the local VCPs will be limited to 11, 21, 31, and 32. The Change command is used at the RPG in order to invoke one of the local VCPs. The remote VCPs are stored at the RPG and are downloaded to the RDA from the RPG. The remote VCPs are 11, 12, 21, 121, 31 and 32 (Figure 3).

The RCP8 also relays information to the transmitter through the RVP8. For example, different PRFs are implemented throughout a VCP, and the transmitter needs to know how rapidly to transmit pulses. The RCP8 sends the PRF information to the RVP8. The RVP8 triggers the transmitter at the correct rate for the current PRF.

**KVM**

At the RDA shelter, the Keyboard Video Mouse (KVM) and Monitor provide access to both the RCP8 and the RVP8. The KVM is the interface for local user access only (Figure 4).

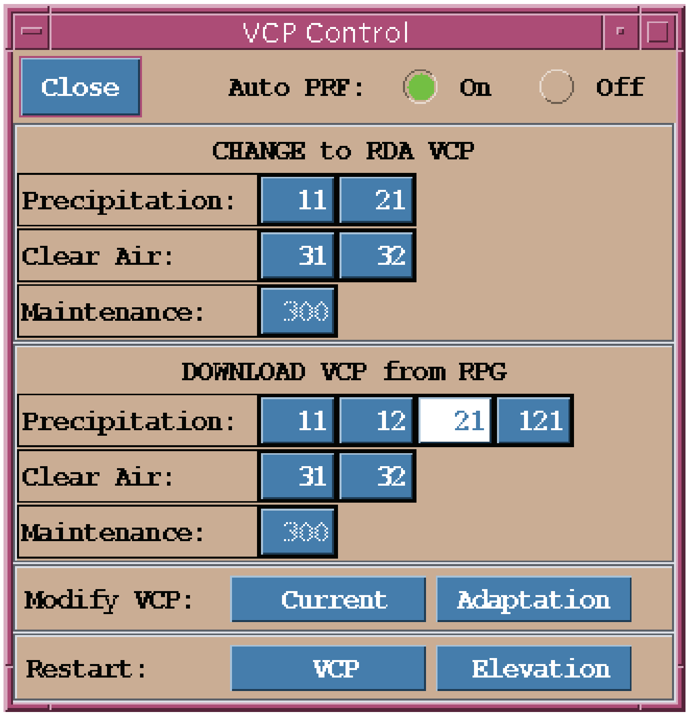



**Figure 3.** VCP Control window. Note VCPs stored at the RDA vs. RPG.

**Figure 4.** The KVM and monitor, for local user access.

**GPS**

The ORDA has a GPS server that sets the clocks on the RVP8 and the RCP8 within very close tolerances. The GPS servers will increase the accuracy for ***every*** WSR-88D with respect to time. Since it is GPS-based, the location of each radar will also be highly accurate (Figure 5).

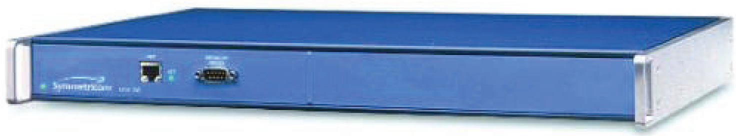


**Figure 5.** The GPS server.

## RDA HCI at the MSCF

The MSCF (Figure 6) is used to launch the RPG Human Computer Interface (HCI). The RPG HCI is the set of windows where weather decision makers perform radar control tasks such as downloading VCPs or changing the Doppler PRF. The windows within the RPG HCI that are impacted by the ORDA will be presented where appropriate in the Operational Impacts section (page 8).

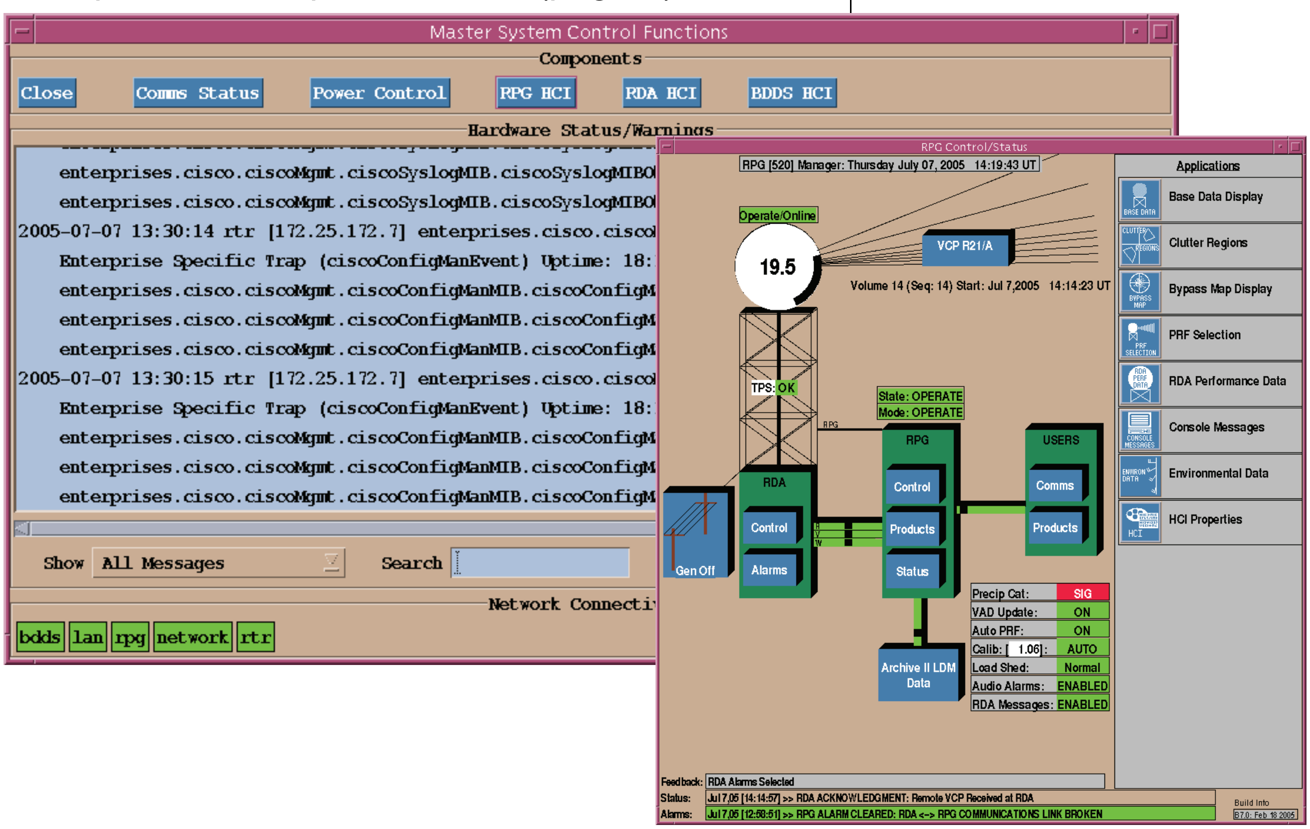



**Figure 6.** MSCF and the RPG HCI.

With the ORDA ***and RPG Build 8.0***, a new HCI will be accessible from the MSCF by clicking on the RDA HCI button. The RDA HCI main page that will appear is the same interface that is available to technicians locally at the RDA shelter. The design is similar to the RPG HCI, with dynamic status information such as

- the current VCP and elevation angle
- the state of the wideband connection
- RDA state (operate or standby)
- power source (utility or generator)

## Operational Impacts

This section presents the operational impacts of the ORDA:

**1.** Improvements in calibration

**2.** Improved sensitivity in long pulse (VCP 31)

**3.** New clutter suppression technique: Gaussian Model Adaptive Processing (GMAP)

**4.** Improvements to the quality of Spectrum Width estimates

**5.** Differences in elevation angle settling

**6.** End of first trip velocity less noisy with ORDA

**7.** Differences in types of RDA Alarms

**8.** False Alarm at AWIPS

### 1. Improvements in Calibration

The ORDA design offers a better calibration procedure which is both more accurate and simpler to implement. Compared to the legacy design, there are only about 1/3 the number of components that need to be calibrated. In addition to fewer components that require calibration, this shortens the “path” that the signal must follow.

Calibration is performed by injecting a test signal into the receiver and comparing the actual result to an expected result. With the legacy design, the test signals that were used were at two fixed power levels. With the ORDA, the test signal used for calibration varies over the ***entire*** dynamic range of the received signal, i.e. from the weakest to the strongest. Testing has shown that the dynamic range for ORDA is 96 dB, which is 3 dB better than the NEXRAD specifications.

Off-line Calibration

The off-line calibration process is better automated and can be viewed graphically. The technician is able to see the actual dynamic range that was generated, and can also see the linearity of the transition from lower to higher power (the more linear, the better).

On-line Calibration

As with the legacy RDA, an on-line calibration procedure is performed at the end of each volume scan as the antenna drops back down to 0.5°. A number (Delta Sys Cal at AWIPS or Calib at the RPG HCI), will continue to be generated each volume scan, with ±4 as a maintenance mandatory condition and ±2 as a maintenance required condition. With the calibration improvements that the ORDA brings, this number is expected to show less variation over time as compared to the legacy RDA.

With fewer components as compared to the legacy RDA, this on-line calibration procedure is completed much faster with the ORDA.

Calibration and Radar Products

A better calibrated radar produces better quality Base Data, which positively impacts ***all*** of the Base and Derived Products. Rainfall estimates are particularly sensitive to calibration. With the $Z=300R^{1.4}$ relationship, a calibration error of +4 dB ***doubles*** the rainfall rate, while an error of -4 dB ***halves*** the rainfall rate. Calibration errors that are not this extreme still result in significant rainfall estimation errors over time. The simpler and more accurate calibration procedures with ORDA are expected to reduce the impact of calibration errors on the accuracy of rainfall estimates.

**2. Improved Sensitivity in Long Pulse (VCP 31)**

One benefit of the ORDA hardware design is an improvement in the sensitivity, especially when using long pulse, or VCP 31. Having some tasks performed digitally with ORDA eliminates losses due to hardware that were present with the legacy RDA. This results in an increase in long pulse sensitivity of about 3 dB, which will improve detection of weak returns such as boundaries and snow bands.

**3. New Clutter Suppression Technique: GMAP**

Reference: *A First Look at the Operational (Data Quality) Improvements Provided by the Open Radar Data Acquisition (ORDA) System*, J. Chrisman, C. Ray, Radar Operations Center, Norman, OK

The new clutter suppression technique with ORDA is called Gaussian Model Adaptive Processing (GMAP). Gaussian is part of this title because the technique assumes that the power spectrum for weather targets, as well as clutter, is a Gaussian curve. Adaptive is part of this title because the routine adapts to the weather and clutter that is present in each range bin. Signal removal is based on the spectrum width of the clutter signal, which GMAP identifies in an iterative process.

There are similarities and differences between the legacy RDA clutter filtering technique and GMAP with respect to both design and implementation. The ***most significant difference*** between GMAP and the legacy RDA clutter filtering technique is that ***most of the weather signal*** that is removed with the clutter ***will be restored***.

Legacy RDA filtering

With legacy RDA clutter suppression, a level of suppression (low, medium, or high) was selected for each clutter region defined. Each of these levels of suppression had an associated velocity notch width, though the actual notch width varied depending on the antenna rotation rate and the waveform. Clutter filtering was applied to the signal that fell within the particular notch width, centered on zero velocity. Velocity notch widths ranged from ±1.7 kts in the lower (Split Cut) elevations to ±10 kts or more in the middle (Batch) elevations.

This technique worked well provided that the entire clutter signal was within the notch width and the entire weather signal was outside of the notch width. ***Any*** signal that fell within the notch width was removed, whether it was composed of clutter or weather. Once the signal was removed by the legacy clutter filters, it was no longer recoverable. In Figure 7, both the clutter signal and the weather signal are centered at zero velocity and clutter filtering has not yet been performed. The black curve is the Gaussian estimate of the weather signal.

Figure 8 depicts the result after legacy RDA clutter filtering has been applied. The clutter signal falls within the notch width and has been removed, but the weather signal within the notch width is also removed. Since the computed returned power is the area under the curve, legacy RDA clutter filtering in Figure 8 results in a loss of returned power for that range bin and an underestimate of reflectivity.

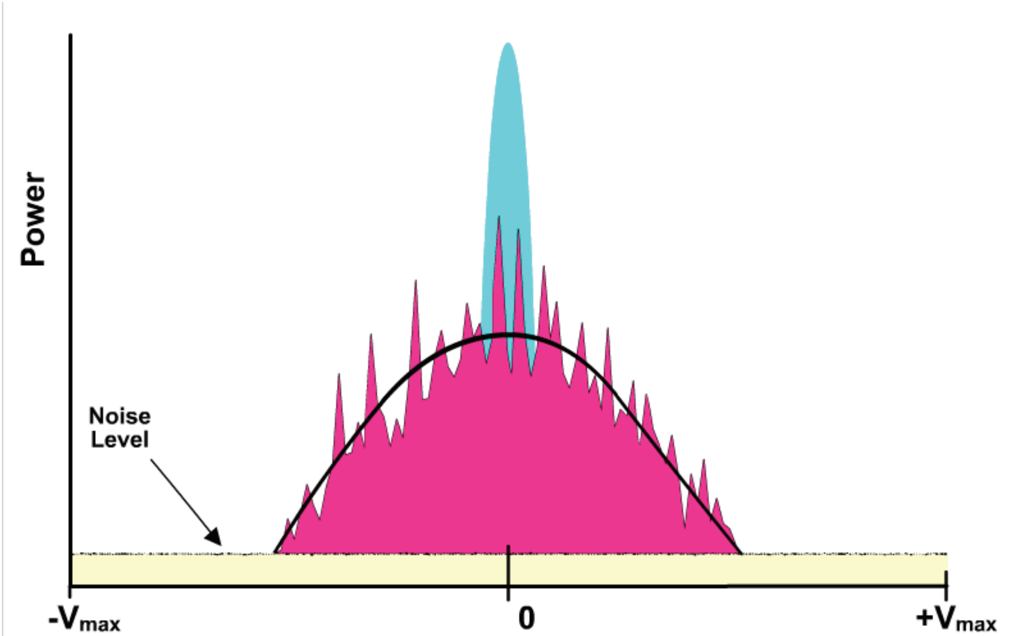



**Figure 7.** Before legacy RDA filtering is applied, a clutter signal (blue) and a weather signal (red) are both centered on zero velocity.

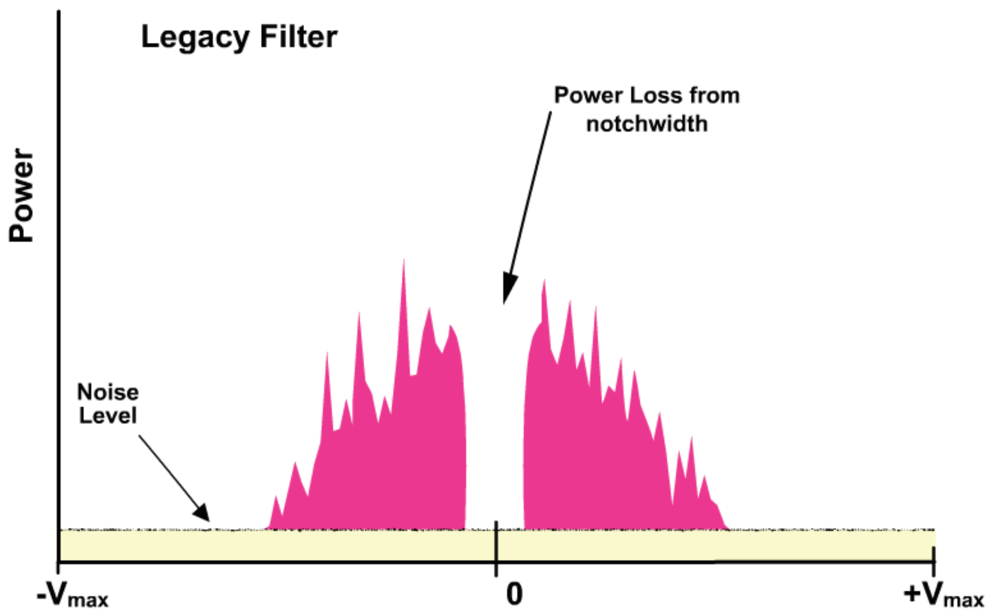



**Figure 8.** Legacy RDA clutter filtering has been applied. Though the clutter signal has been removed, the weather signal that fell within the notch width has also been removed.

GMAP clutter filtering

GMAP still removes a portion of the signal centered around zero velocity. However, the width of what is initially removed is not fixed, but adaptive. GMAP processing also has steps that rebuild the weather signal using the Gaussian estimate of that signal which existed prior to clutter removal. The performance improvement with GMAP will be most noticeable where there is ***both*** clutter and weather signal in the same range bin. See Figure 9 for the result of GMAP suppression in the case where the clutter and weather signal are both centered on zero (same initial condition as in Figure 7).

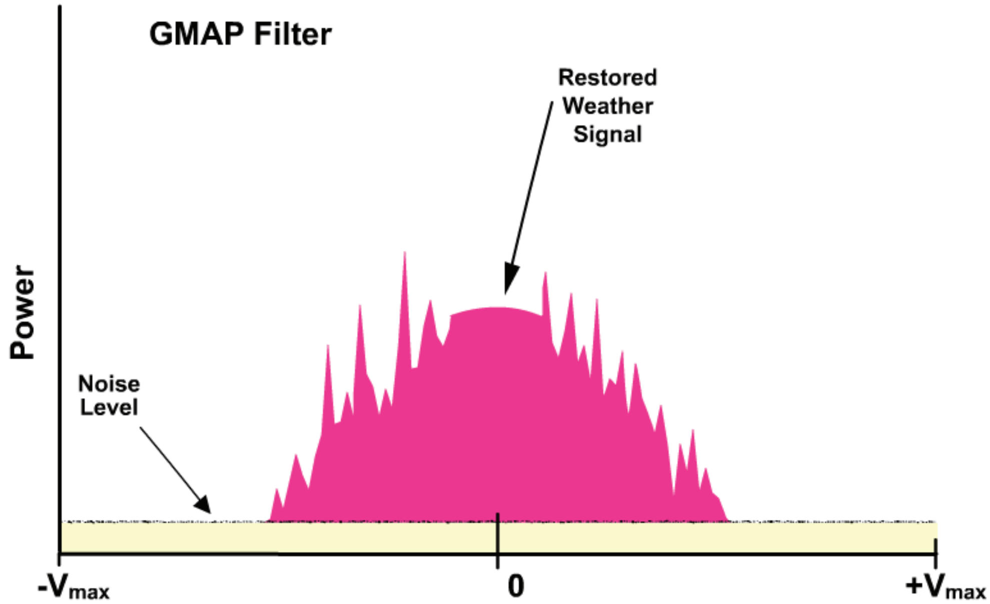



**Figure 9.** GMAP clutter filtering has been applied. Though the clutter signal has been removed, the weather signal has been mostly restored.

Weather signals are not usually centered at zero velocity. GMAP can rebuild any portion of the weather signal that falls within the clutter signal that was initially removed. In Figure 10, the weather signal is offset from zero and no clutter filtering has yet been applied.

In Figure 11, the legacy RDA filtering has been applied. A portion of the weather signal has been removed along with the clutter signal. This will result in a loss of power and an underestimate of reflectivity. Since velocity estimates are power weighted, the power loss would also bias the velocity estimate away from zero.

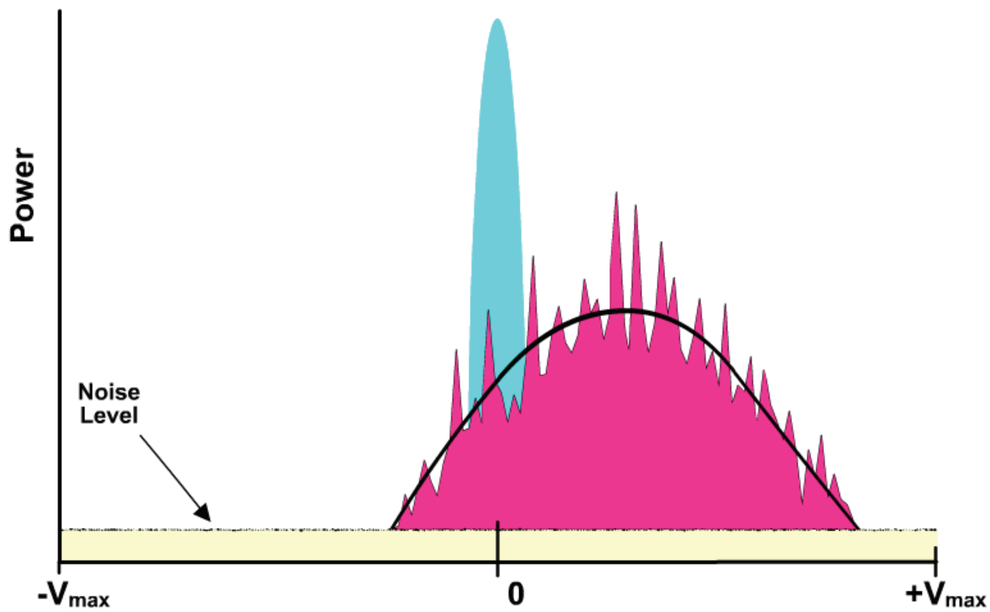



**Figure 10.** In this example, the weather signal is not centered at zero velocity.

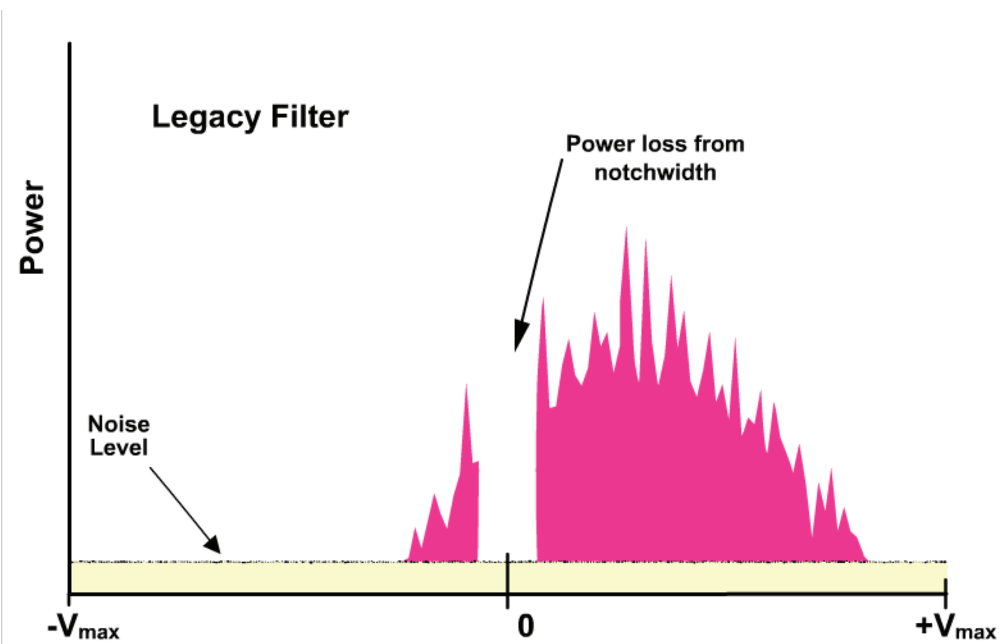



**Figure 11.** Legacy RDA clutter filtering has been applied. Though the clutter signal has been removed, the weather signal that fell within the notch width has also been removed.

In Figure 12, GMAP filtering has been applied. A portion of the weather signal was initially removed along with the clutter signal. GMAP then rebuilt most of the weather signal across the gap.

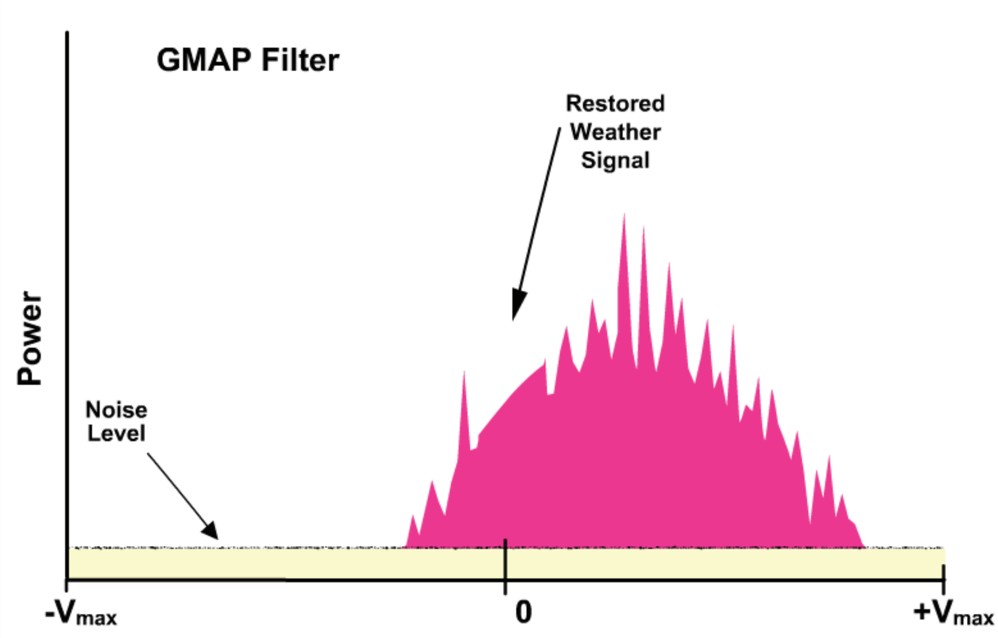



**Figure 12.** GMAP clutter filtering has been applied. Though the clutter signal has been removed, the weather signal has been mostly restored.

Radar example of GMAP performance

In Figure 13, the velocity image shows the clutter pattern near the RDA when there is no weather present. Note the areas where clutter has been removed, particularly a ridge that exists at short range to the southwest.

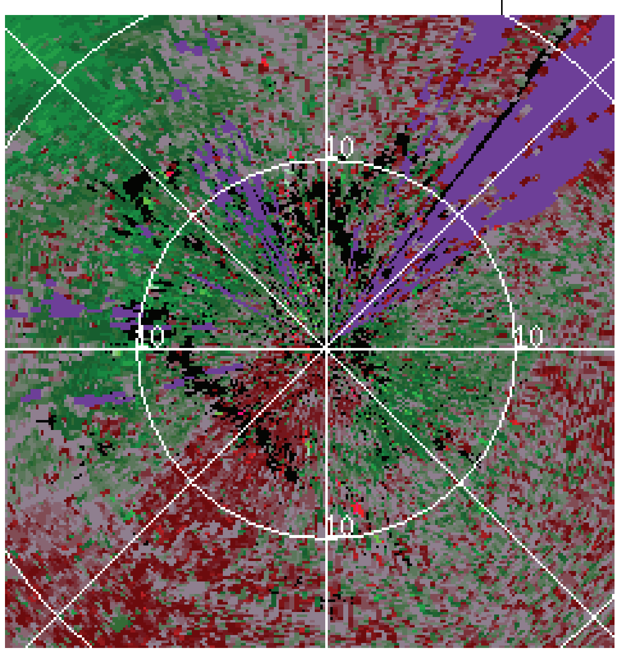



**Figure 13.** Example of GMAP clutter removal with no weather present. Note the ridge at close range to the southwest

In Figure 14, the reflectivity image on the left shows that a squall line has passed through and is just east of the RDA (note the scale of the range rings). On the associated velocity image which has been zoomed in over the RDA, note that there are weather returns available over most of the areas of clutter. The ridge to the southwest is no longer apparent.

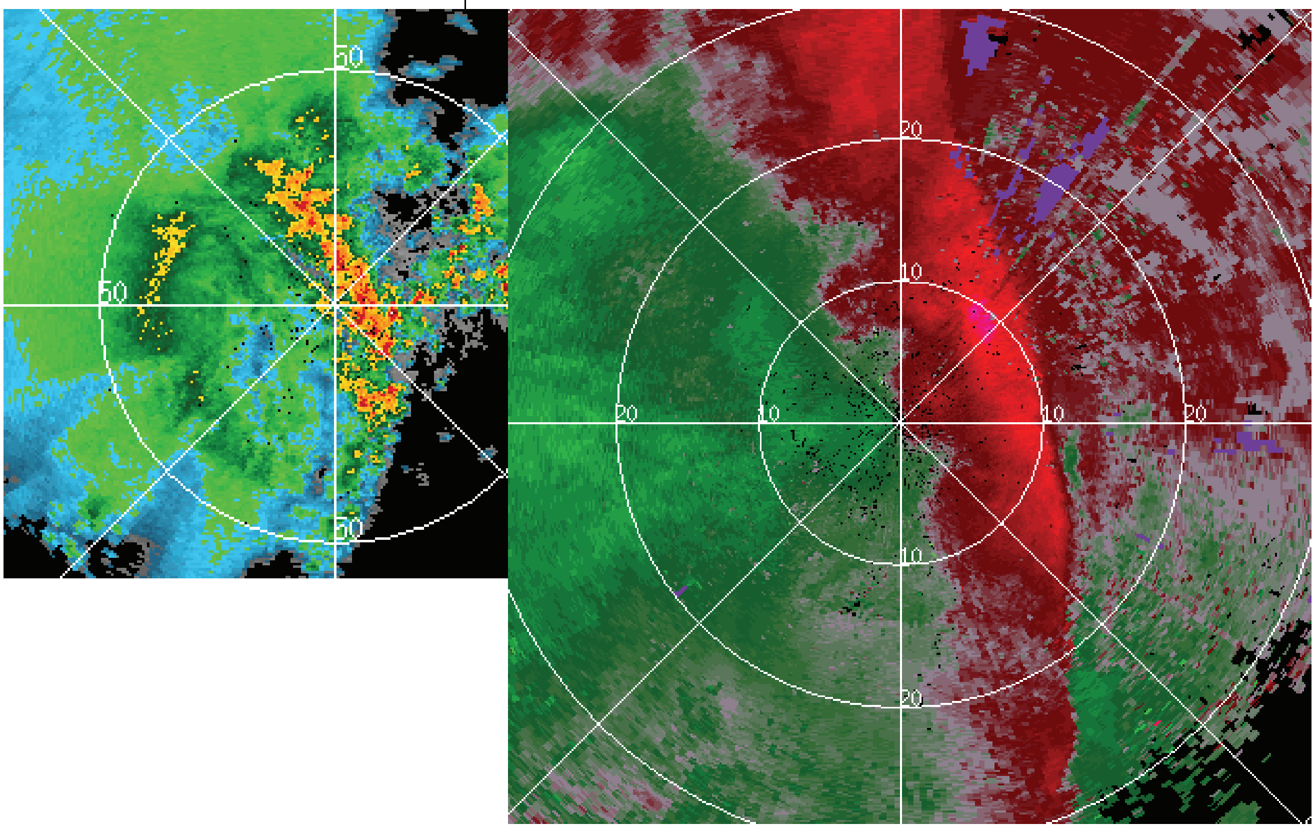



**Figure 14.** Example of GMAP clutter removal and weather recovery with a squall line passing through.

No more notch widths or channels

In addition to no more notch widths (levels of suppression), there is no longer a difference between the Doppler and Surveillance channels. The two columns for Doppler and Surveillance channels on the Clutter Regions window have been removed (Figure 20 on page 23).

Differences in Clutter Censoring

Clutter censoring is a technique used by both the legacy RDA and ORDA after clutter filtering has been performed. It is an attempt to remove residual clutter. If the residual clutter does not represent any weather signal, it is censored, which means it is not displayed. The censoring technique for ORDA has some differences that will improve the availability of data in clutter prone areas. For example, the censoring process with the legacy RDA is performed on bins of .54 nm (1 km) range resolution. With ORDA, censoring is performed on bins of .13 nm (.25 km) range resolution. This results in less data loss and an overall smoother appearance with ORDA (Figure 15).

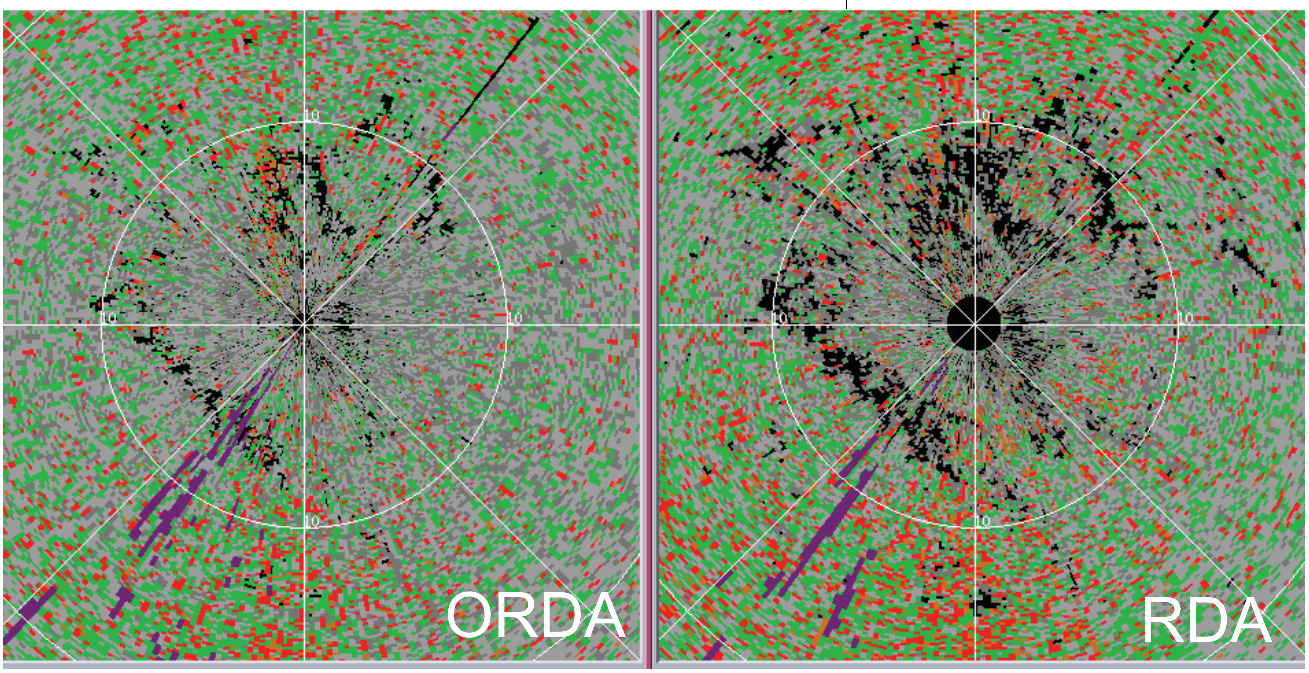



**Figure 15.** Example of differences in clutter censoring with ORDA (left) vs. legacy RDA (right).

## Types of Suppression Unchanged

### Bypass Map

The Bypass Map is still a “yes/no” map for whether or not to apply filtering. The Bypass Map will continue to be used to address contamination from normal clutter targets (e.g. terrain and buildings). The resolution of the ORDA Bypass Map is better: 1° x .54 nm as compared to 1.4° x .54 nm with the legacy RDA. A “yes” to performing suppression for any particular 1° x .54 nm bin is dependent on the characteristics of the returned signal. Clutter characteristics are high power, low velocity and low spectrum width.

*Bypass Map Generation*

The conditions under which a new Bypass Map should be generated have not changed with GMAP. The Bypass Map should be generated under conditions of ***no precipitation, no AP or other abnormal beam refraction***. When the Bypass Map is generated, two versions of the signal characteristics for each range bin are compared:

**1.** unprocessed data (power, velocity, and spectrum width)

**2.** data processed by GMAP (power, velocity, and spectrum width)

If there is a significant power difference between these two versions, then the bin is flagged as requiring clutter suppression. That's why it is ***so important*** to generate new Bypass Maps under conditions where ***only*** "typical" clutter exists. Generation of a new Bypass Map will be a much faster process with the ORDA. It is still an off-line procedure, but will take 10 to 15 minutes.

For the Build 7.0 ORDA, there will continue to be two maps generated. The first map is for elevation angles below 1.65° and the second map is for elevation angles above 1.65°. These two maps correspond to each of the two segments, low and high. There may be additional segments available in future builds, resulting in additional Bypass Maps.

All Bins

It will still be necessary to use All Bins suppression for areas of AP. Since AP is transient in space and time, the Bypass Map cannot identify where the clutter targets are located. All Bins suppression applies suppression on ***every*** bin throughout the geographic region that has been defined.

Applying All Bins suppression to areas of AP by GMAP has been found to be just as effective at removing the AP as the legacy clutter suppression technique. However, since GMAP is able to restore most of any weather signal that is initially removed, there is less bias in the base data. With All Bins suppression in the legacy RDA applied to weather, reflectivities were often significantly reduced and velocities were biased away from zero. With GMAP, the base data will be less biased when All Bins is used, as compared to the legacy RDA.

AP Removal Example

In the following example, a large area of AP exists over most of the radar display with small areas of precipitation to the east and south (Figure 16).

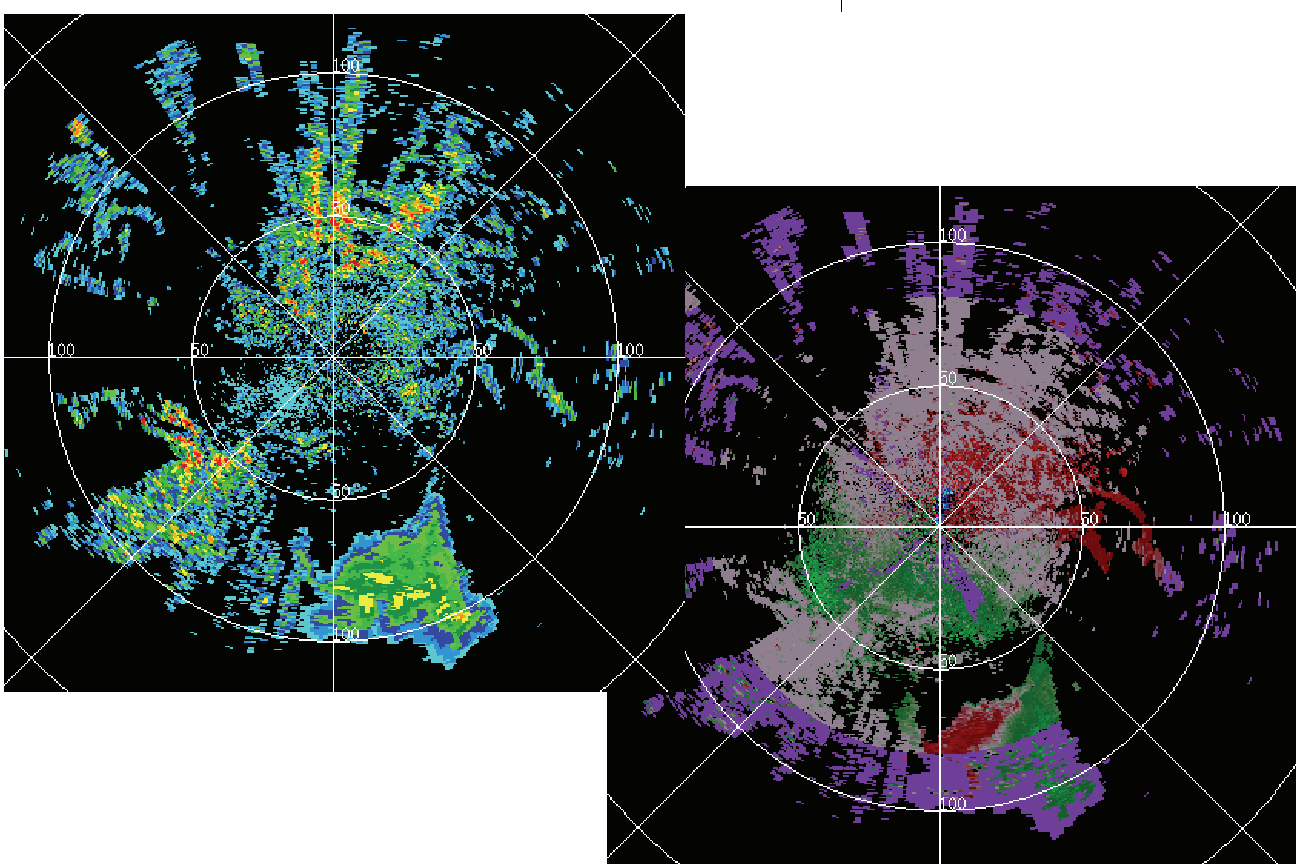


**Figure 16.** There is unfiltered AP over most of the display with areas of precipitation to the east and south.

This data example was captured for both ORDA and a legacy RDA which was nearby. For both radars, All Bins suppression was applied to address the AP contamination. In Figure 17, All Bins suppression is applied to the ORDA and legacy RDA Reflectivity data. In Figure 18, All Bins suppression is applied to the ORDA and legacy RDA Velocity data. Note that the ORDA GMAP is just as effective at removing the AP as the legacy RDA technique.

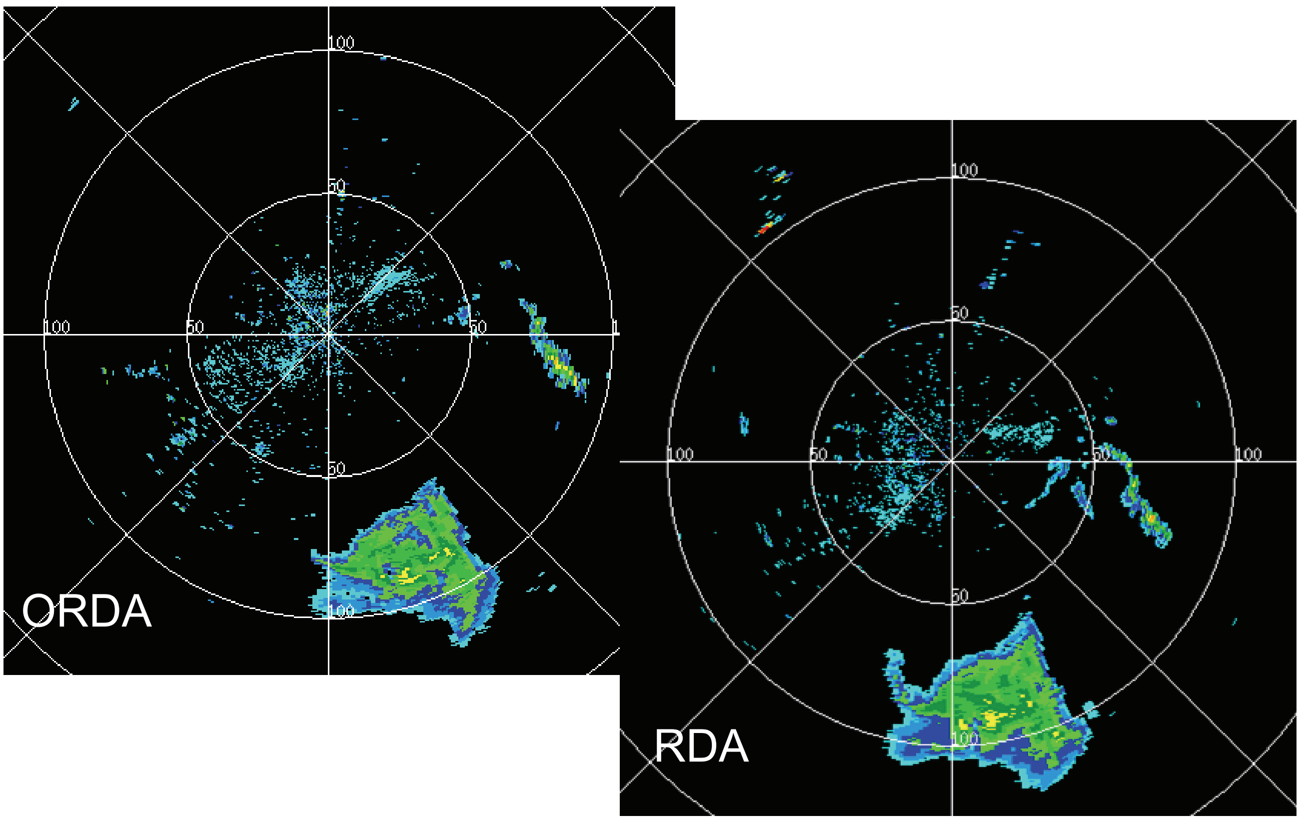



**Figure 17.** AP removal using All Bins for Reflectivity (ORDA left and legacy RDA right).

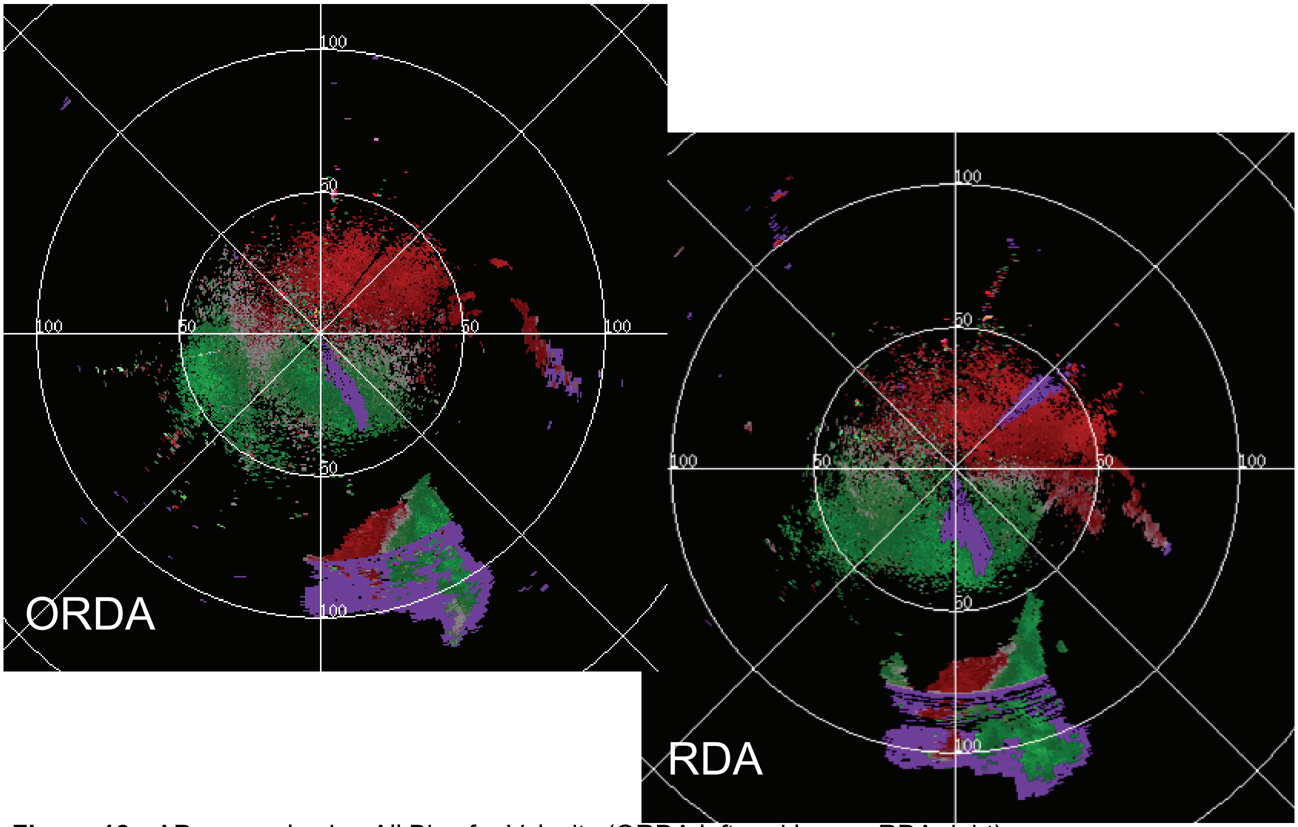



**Figure 18.** AP removal using All Bins for Velocity (ORDA left and legacy RDA right).

## Differences in the Zero Isodop Area with All Bins

When All Bins suppression is applied, there is a difference in the appearance of the zero isodop area with the legacy RDA vs. the ORDA. Note from Figure 19 that the zero isodop area with the legacy RDA (right) is very narrow compared to the ORDA (left). This example is from a Batch mode elevation, where the difference will be the greatest. Since the legacy RDA is unable to restore any weather signal that is removed, the velocity estimates are often biased away from zero. With GMAP, most of the weather signal is restored, significantly reducing this bias. The result is a wider, more realistic zero isodop area.

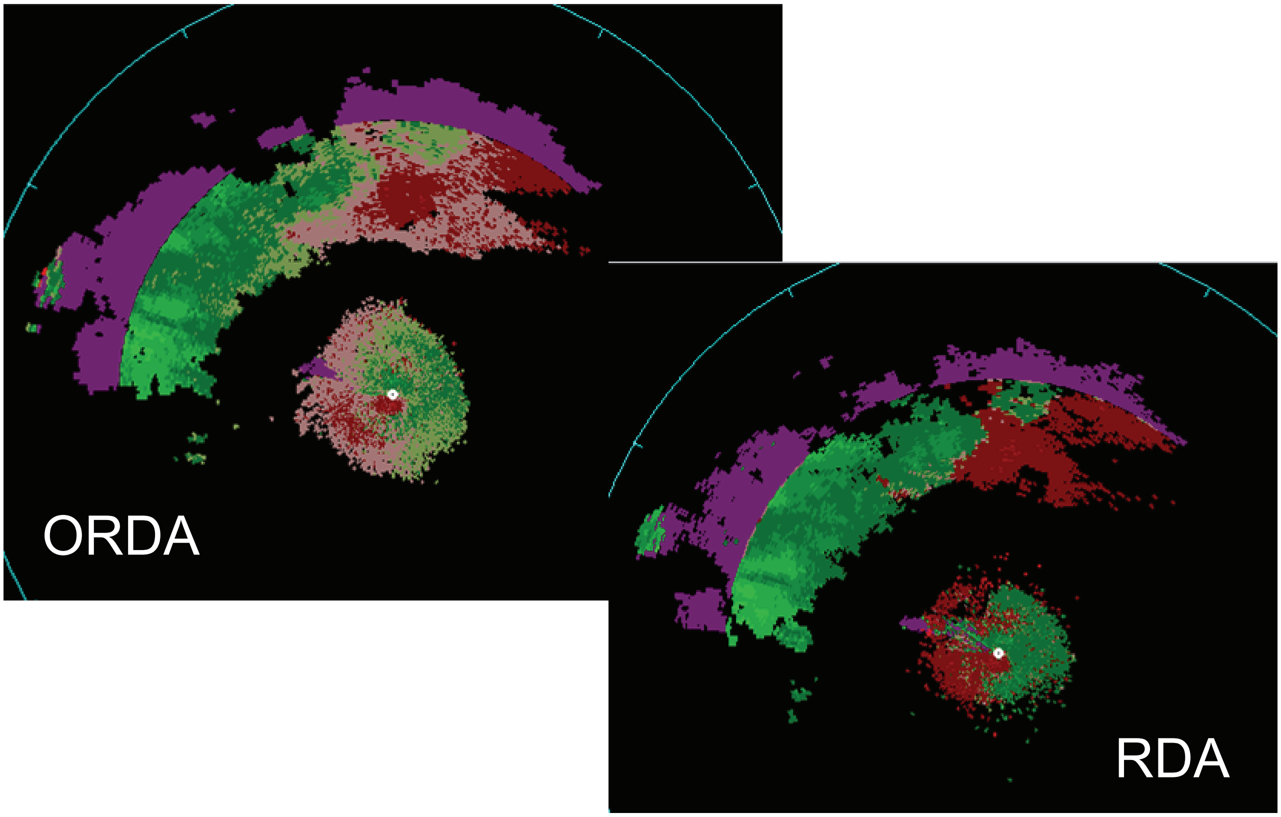



**Figure 19.** Difference in zero isodop area with ORDA left and legacy RDA right.

## Implementing GMAP Clutter Suppression

**Region and Select Code**

There are fewer operator decisions required with GMAP. The geographic area (range to range and azimuth to azimuth) for a clutter suppression region still needs to be determined, followed by the Select Code (Bypass Map, All Bins, or None), which defines the type of suppression. Levels of suppression for the Doppler and Surveillance channels no longer need to be determined.

**Elevation Segment**

Another difference with the Clutter Regions Editor window design (Figure 20) is the number of elevation segments. With the legacy RDA, there were two segments, low (<1.65°) and high (>1.65°) and two Bypass Maps were built, one for each segment.

The GMAP allows for up to five different segments, which are displayed on the Clutter Regions Editor window. However, the initial deployment of ORDA will match the legacy design. Segment 1 will be the low segment and Segment 2 will be the high segment. If additional segments become selectable in later builds, the Bypass Map generation process will build one map for each segment.

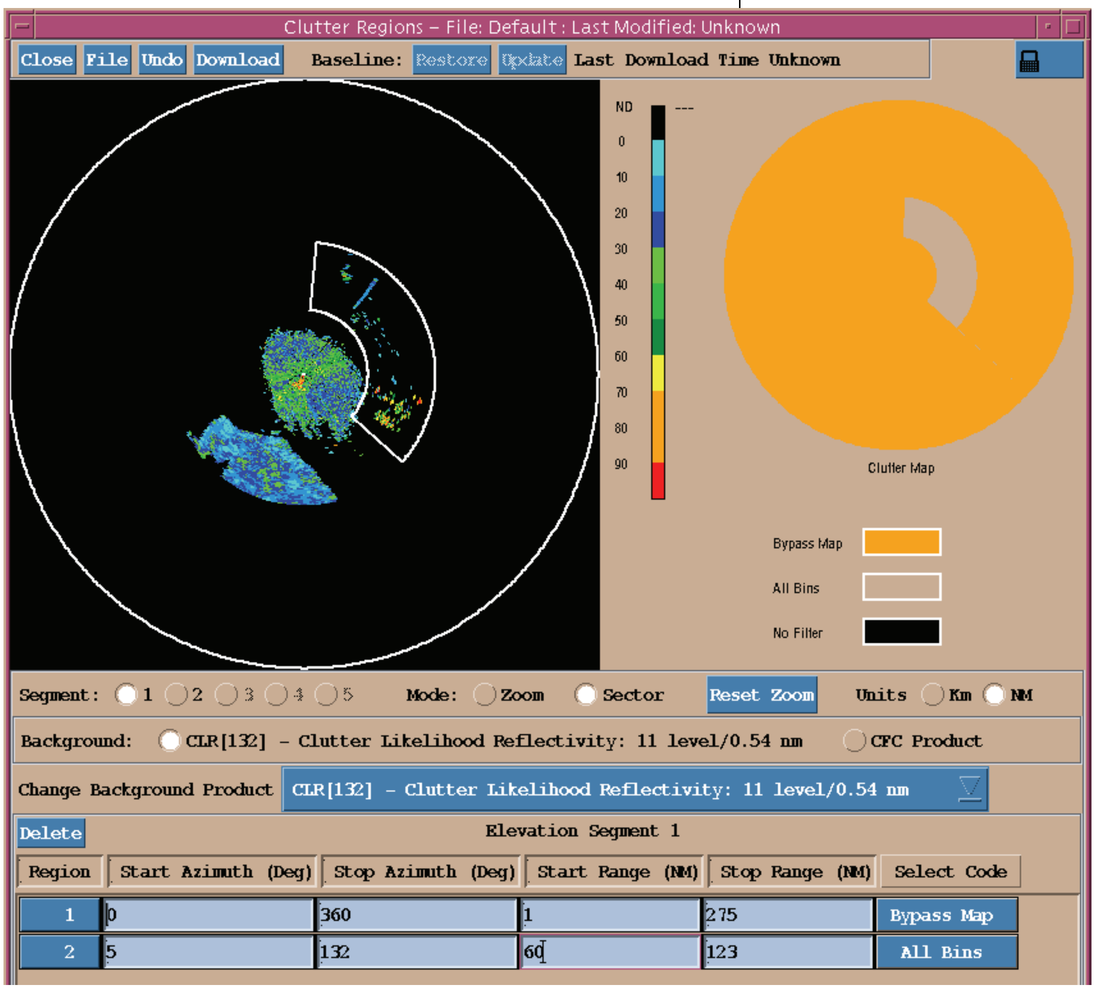



**Figure 20.** Clutter Regions window at RPG with ORDA installed.

## GMAP Beta Test Procedures

1. Bypass Maps will be generated by the ORDA installation team as soon as the installation is complete. This is done to verify that the map generation process is valid, and is unlikely to be conducted under ideal conditions.

2. Test sites should use GMAP All Bins everywhere until Bypass Maps can be generated under ideal conditions.
3. Bypass Maps should be generated once ideal conditions permit.
4. Test sites should then use GMAP Bypass Map or All Bins mode as they judge operationally appropriate. At times, data quality or beta test personnel may request that a site switch clutter configuration and/or VCP to collect special data for evaluation.

### 4. Improvements to the Quality of Spectrum Width Estimates

Though the same technique is used by ORDA for estimating spectrum width, ORDA design allows for a better implementation as compared to the legacy RDA. There were two sources of spectrum width errors with the legacy RDA:

1. hardware
2. noise compensation software

The legacy RDA hardware device that contributed to spectrum width errors no longer exists with ORDA. ORDA provides the needed software upgrade at the RDA to correct this error. Where the returned signal is weak, it will be close to the noise level. Weak signals can result in erroneously high spectrum widths. System noise plays havoc with spectrum width calculations and must be compensated for. The ORDA does a better job of compensating for system noise, as compared to the legacy RDA.

Spectrum width data generated by the legacy RDA had a bias toward higher values and a more noisy appearance. Though there will still be high spectrum widths with a weak power signal, the frequency of occurrence is lower with ORDA and the overall appearance is less noisy. In addition to product appearance, these improvements to the Spectrum Width estimation also produce better input to the Radar Echo Classifier (REC) algorithm The REC uses all three base moments to determine areas of unaddressed clutter. The REC is used by the Precipitation Processing System (PPS) to remove clutter from precipitation products.

In Figure 21, the Spectrum Width on the left was generated by the legacy RDA, while the Spectrum Width on the right was generated at the same time by the ORDA on a radar very close by. Note that the legacy RDA image has more high values and is noisier in overall appearance.

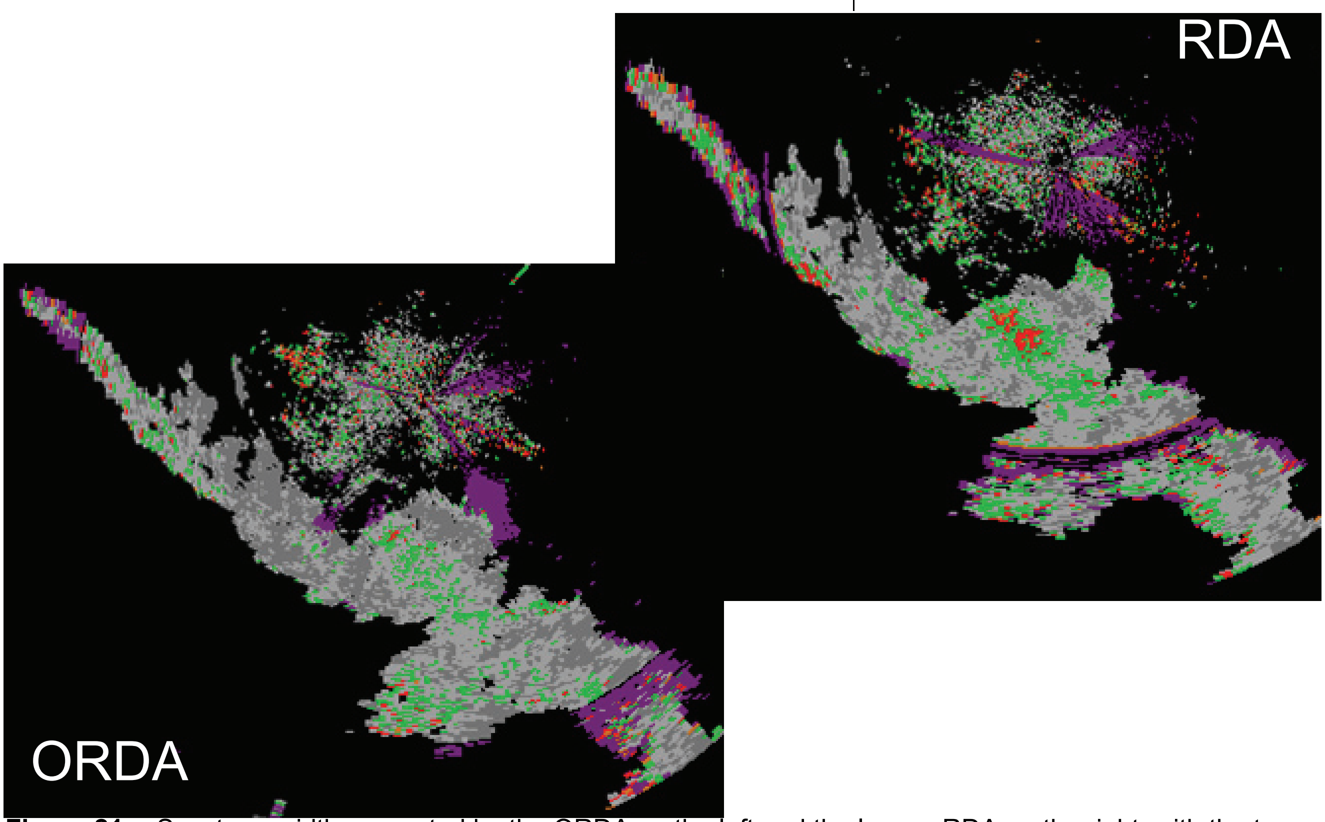



**Figure 21.** Spectrum width generated by the ORDA on the left and the legacy RDA on the right, with the two radars close together. Note that the legacy has more high values and the overall look is noisier.

## 5. Differences in Elevation Angle Settling

As the antenna transitions from one angle to the next, there is a short time required for the antenna to settle on the given angle and to then begin collecting data. The NEXRAD system requirement is that the antenna must be within 0.2° of the target elevation angle before data collection begins. The antenna settling process is the most challenging at 0.5°, since the antenna has transitioned down from the highest elevation of the particular VCP (19.5° or 4.5°). Occasionally, this settling effect has been and still will be apparent in the data, causing a discontinuity from the azimuth where data collection began compared to where it ended.

Figure 22 is a 0.5° Base Reflectivity product from an ORDA field test conducted at Corpus Christi, TX. Note the discontinuity to the west-southwest. Data collection began at the 247° azimuth (antenna rotating clockwise) and the antenna angle was actually at 0.65°. By the end of data collection, the antenna angle was at 0.48°. The ORDA will often start data collection above 0.5°, then transition down to 0.5°.

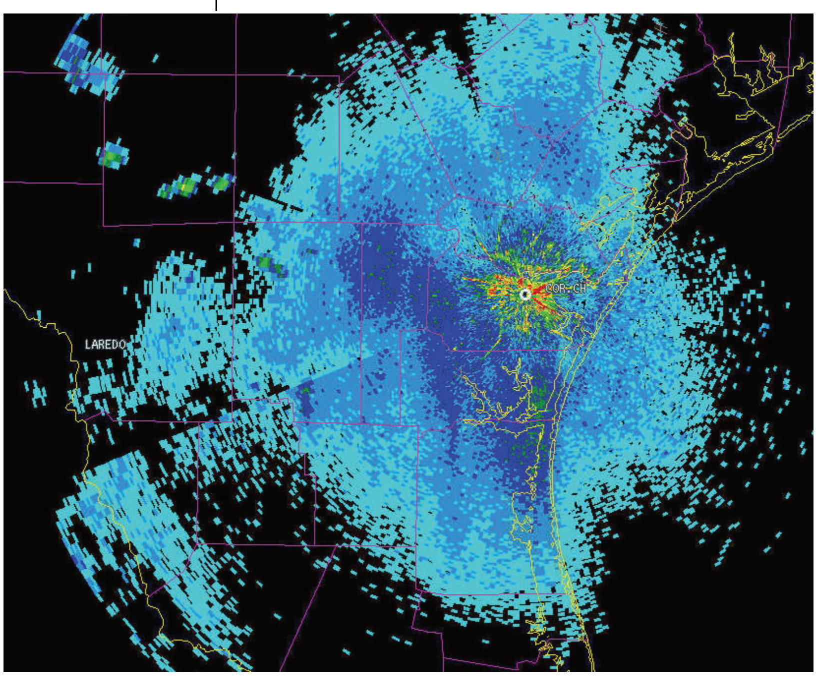



**Figure 22.** ORDA field test at CRP. Antenna settling results in a data discontinuity at 0.5°

Though this data discontinuity has occurred in the past with the legacy RDA (Figure 23), it is expected to be more frequent with ORDA at 0.5°, and there are plans to improve antenna settling performance in a future software build. Data collection begins at 0.5° once the antenna is within 0.2° of 0.5° ***and*** the on-line calibration check is complete (performed as the antenna transitions from 19.5° to 0.5°). With the legacy RDA, the on-line calibration process takes longer and thus allows more time for antenna settling at 0.5°. The legacy RDA behavior is that the antenna will overshoot 0.5°, starting data collection below 0.5°, then oscillate until the antenna angle is stable.

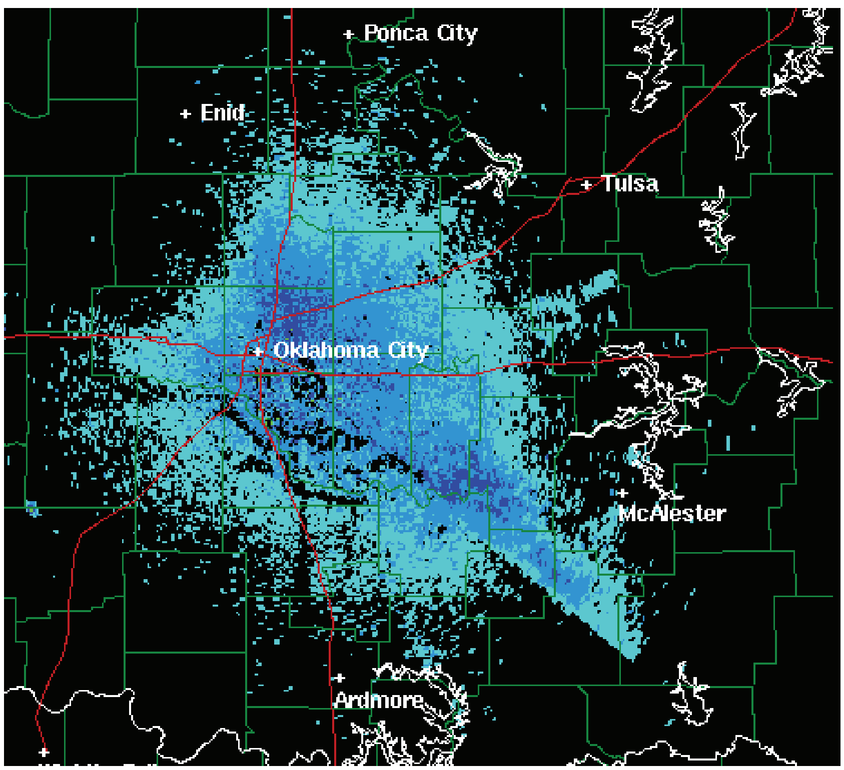



**Figure 23.** Data discontinuity at 0.5° due to antenna settling on a legacy RDA.

## 6. End of First Trip Velocity Less Noisy

With the legacy RDA, the transition from the first to the second trip of the velocity data has often had a narrow ring of false, sometimes noisy, velocity values. This is an artifact of the Range Unfolding Algorithm as it processes the first few bins of data in the first trip (close to the radar) vs. the first few bins of data in the second trip.

The ORDA processes data close to the radar in a way that has reduced the frequency of this problem. For both the Split Cut and the Batch elevations, the transition from the end of the first trip to the beginning of the second trip with ORDA will be be a ring of missing data (Figure 24).

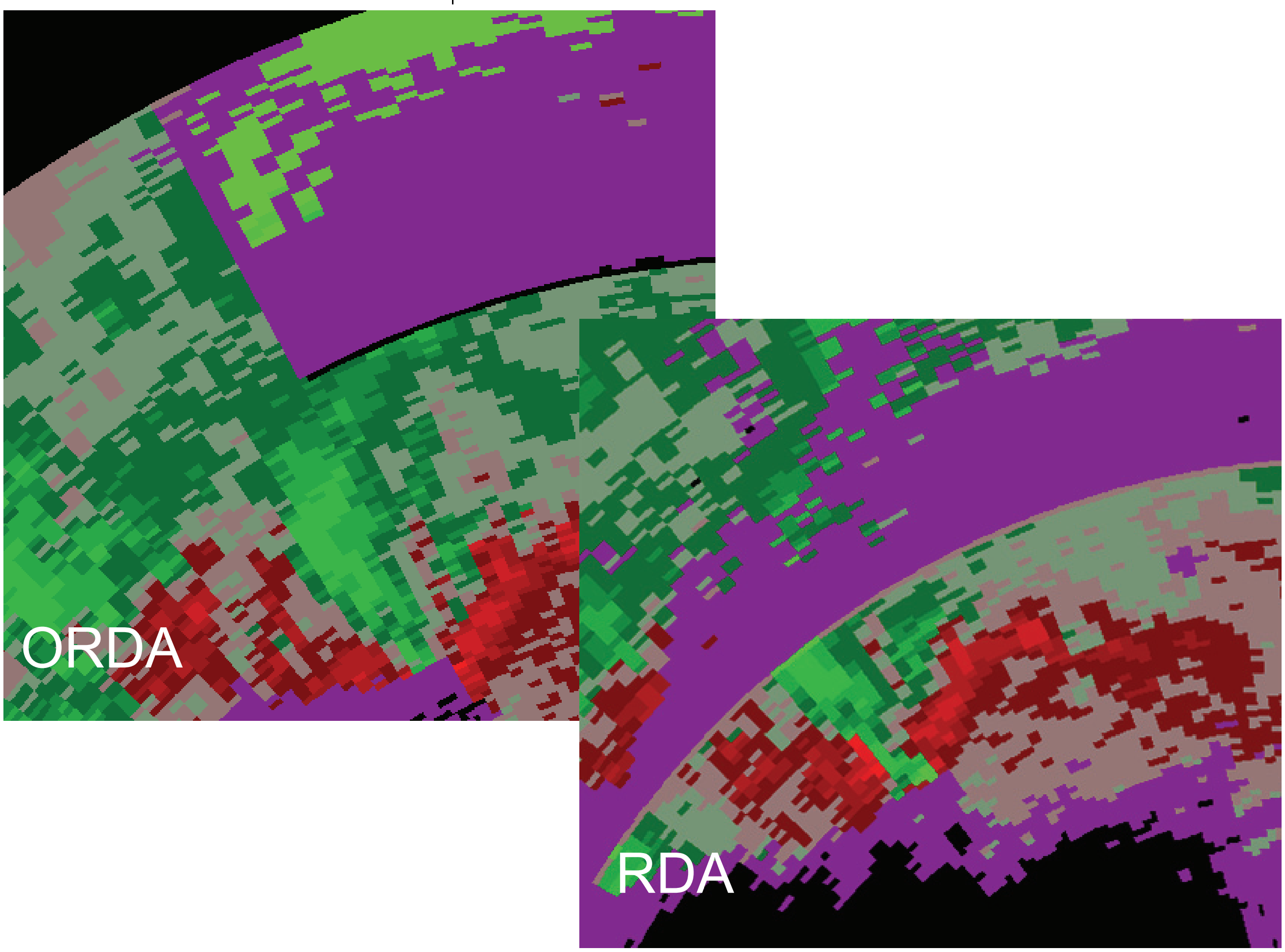



**Figure 24.** Transition from 1st to 2nd trip in velocity data for legacy RDA (right) vs. ORDA (left).

## 7. Differences in Types of RDA Alarms

There are differences in the types of RDA Alarms with the legacy RDA vs. the ORDA. With the legacy RDA, there were 8 types of alarms:

- ARC - Archive II (no longer done at RDA)

- UTL - tower utilities
- CTR - RDA controller (Micro 5 computer)
- WID - wideband
- PED - pedestal
- XMT - transmitter
- RSP - receiver/signal processor
- USR - a device that was not used

With the ORDA, there are 7 types of alarms:

- RCV - receiver (RVP8 and other components)
- UTL - tower utilities
- CTR - RDA controller (RCP8)
- XMT - transmitter
- PED - pedestal
- COM - wideband and RDA LAN communications
- SIG - signal processor (RVP8)

See Figure 25 for a comparison of the RDA Alarms windows for legacy RDA vs. ORDA.

## 8. False Alarm at AWIPS

After ORDA installation, there is the possibility of false alarms indicating an interruption in product flow. When the RDA is accessed through a dial up connection, this alarm is falsely generated. It is a red banner alarm at the bottom of the D2D, but there will be no interruption in radar products.

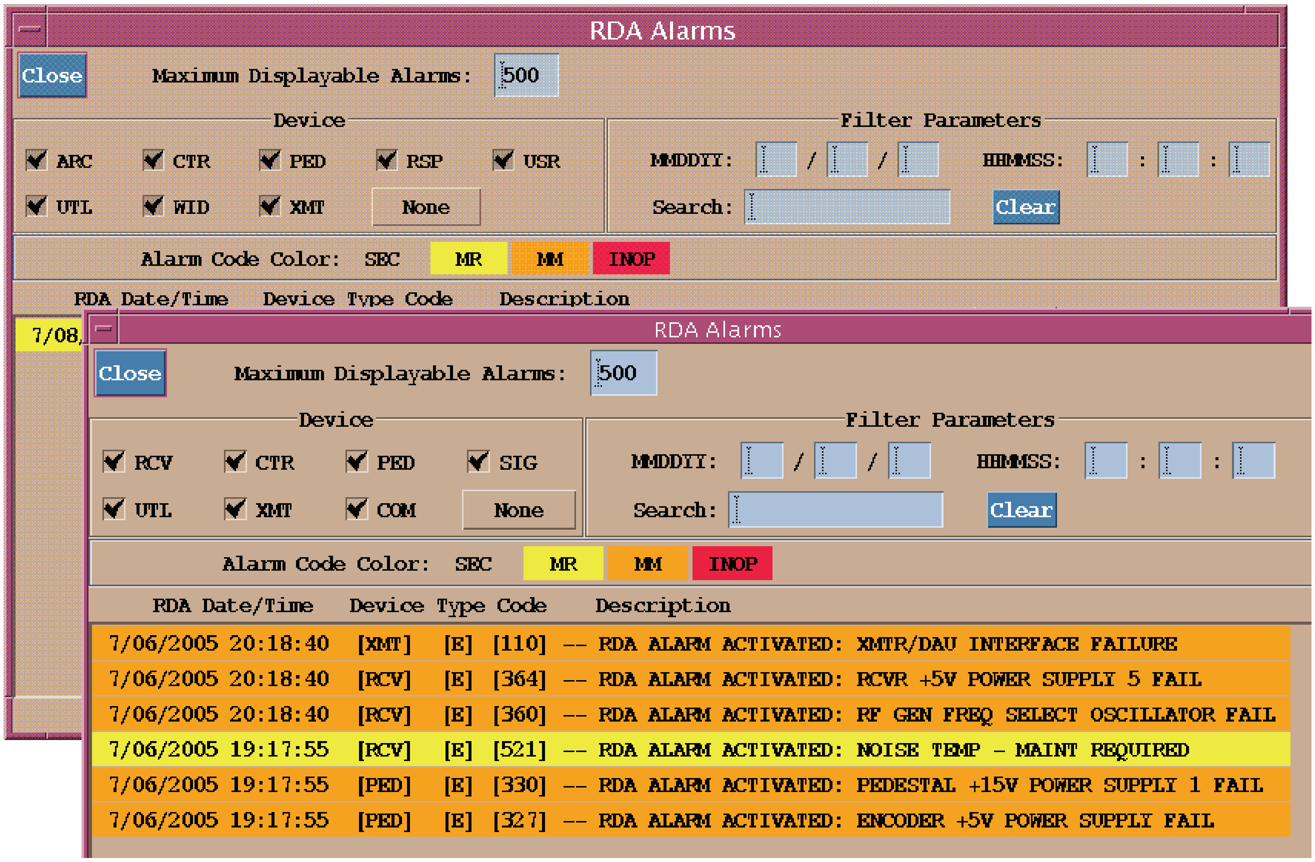



**Figure 25.** Types of RDA Alarms for legacy (top) vs. ORDA (bottom).

## Summary and Resources

This document presents the operational impacts of ORDA Build 7.0. There are differences in the appearance of the Base Data with the legacy RDA vs. the ORDA. In some cases, the differences have minimal operational impact. In other cases, the differences are the result of improvements in the quality of the Base Data due to ORDA design.

The ORDA Build 7.0 Beta Test Training web site is available. All relevant training materials are available from this page:

http://wdtb.noaa.gov/buildTraining/ORDA/